Both applied and theoretical courses are offered in Statistics and Probability. The foundational courses STA222Y, 242Y, 262Y and 352Y are distinguished primarily by their mathematical demands, as indicated by the prerequisites. Students interested in the Biological or Social Sciences will generally find the single most relevant course of the more advanced courses to be, respectively, STA402H or 302H. Furthermore, the probability course STA347H will be of interest to those whose field of application includes model building.

In the introductory courses, and in advanced courses on applied aspects of statistics, computer packages are used. No previous experience is needed.

*Undergraduate Secretary:* Professor P.L.J. Ryall, Sidney Smith Hall, Room 6002 (978-4457)
*Departmental Office:* Sidney Smith Hall, Room 6003 (978-3452)
**Programmes:** Actuarial Science; Computer Science and Statistics; Economics and Statistics; Mathematical Statistics; Statistics

STA222Y **Statistics: A General Survey** 52L, 26P, 26T
A basic course in standard statistical methods and applications (Students planning advanced study in statistics should enrol in STA242Y/262Y/352Y). Frequency distributions, populations and samples, probability distributions, tests of significance, confidence intervals, regression and correlation, analysis of variance, introduction to design of experiments, and sampling theory.
*Exclusion:* ECO220Y, 227Y, GGR270Y, PSY201H, 202H, SOC201Y, STA242Y, 262Y
*Prerequisite:* Grade 12 Mathematics and one University course in the physical, social, or life sciences

STA242Y **Probability and Statistics: An Introduction** 78L
Probability spaces, conditional probability and independence, discrete and absolutely continuous random variables, standard distributions, expectation, moment generating functions and sums of random variables, sampling distributions, estimation, significance tests and confidence intervals, regression, analysis of variance, introduction to design of experiments.
*Exclusion:* ECO220Y, 227Y, GGR270Y, PSY201H, 202H, SOC201Y, STA222Y, 262Y
*Prerequisite:* MAT130Y (with co-requisite MAT230Y)/133Y/135Y/139Y/149Y/ 150Y

STA262Y **Probability and Statistics: An Introduction** 78L
This course deals more rigorously with the topics included in STA242Y and is intended primarily for students in certain Specialist Programmes.
*Exclusion:* ECO220Y, 227Y, GGR270Y, PSY201H, 202H, SOC201Y, STA222Y, 242Y
*Co-requisite:* MAT140Y/225Y/229H; MAT234Y/235Y/239Y/250Y

STA300H **Intermediate Applied Statistics** 26L 13P
Topics from Analysis of Variance, Regression Analysis, and Time Series Analysis, with examples from Actuarial Science and Financial Economics.
*Prerequisite:* MAT140Y/225Y/229H; MAT234Y/235Y/239Y/250Y; STA242Y/262Y/352Y

STA302H **Regression Analysis** 39L
Analysis of the multiple regression model by least squares; statistical properties of the least square analysis, including the Gauss Markov theorem; estimate of error; residual and regression sums of squares; distribution theory under normality of the observations; confidence regions and intervals; tests for normality; variance stabilizing transformations, multicollinearity, variable search method, biased estimation.
*Exclusion:* STA301H
*Prerequisite:* STA242Y/262Y/352Y
*Recommended preparation:* MAT140Y/225Y/229H, 234Y/235Y/239Y/250Y

STA322H **Design of Sample Surveys** 39L
Methods of selecting samples to ensure valid inferences about a population at reasonable cost. Both sampling errors and important non-sampling errors, such as non-response, are discussed.
*Prerequisite:*
ECO220Y/227Y/GGR270Y/PSY201H,202H/SOC201Y/STA222Y/242Y/262Y/352Y

STA347H **Probability and Applications**
Methods of the theory of probability and stochastic processes are developed and appl to problems from a variety of fields. Important topics include conditional expectatic generating functions, systems of independent trials, the Poisson model, Markov chains processes, including systems involving costs.
*Prerequisite:* MAT239Y/250Y/STA262Y/352Y

STA352Y **Probability and Statistics**
An abstract and theoretical course in statistics and probability. Topics: probability spa and distributions on $R^1$ and $R^r$; marginal probability, independence, and distributions product spaces; expectations and characteristics of distributions; sequences of rand variables. Inference from symmetry and large sample theory, parametric models and lated estimation and testing, variation-based models, regression analysis and experime design.
*Prerequisite:* MAT (140Y, 150Y)/STA262Y

STA402H **Experimental Design**
The statistical aspects of collecting and analyzing experimental data; analysis of varian and orthogonal designs.
*Prerequisite:* STA242Y/262Y/302H/322H/352Y

STA422H **Methods of Statistical Inference**
A survey course: the mathematical methods of statistical inference.
*Prerequisite:* STA352Y

STA427H **Introduction to Structural Statistics**
The role of structure in statistical modelling and statistical inference, in the sense model elements other than the common space-algebra-measure or density-model. St tural models and their computer analysis. The effect of structure within inference a ments. The consequences of improperly including or omitting structure in the statist modelling process.
*Prerequisite:* STA262Y

STA437H **Applied Multivariate Statistics** 26L,
Practical techniques for the analysis of multivariate statistical data. $T^2$ tests, test means, simultaneous confidence bounds, profile analysis. Multivariate analysis of ance, completely randomized design, randomized complete block design, Latin sq designs, regression and analysis of covariance. Growth curve models, the fitting of p nomials to correlated data. Partial, multiple (R), and canonical correlation. Data re tion, principal component analysis. Discriminant analysis. Computer packages are use
*Prerequisite:* STA242Y/262Y/352Y

STA442H **Methods of Applied Statistics**
Advanced topics in statistics and data analysis with emphasis on applications. Diagn procedures for linear and non-linear models; jackknife, bootstrap and cross validi methods; missing value and updating procedures for general linear models; hierarc models. No previous computing experience is required.
*Prerequisite:* STA302H

STA457H **Time Series Analysis**
Methods of modelling and forecasting with time series. Autocorrelation functions spectra of stationary time series. Autoregressive, and moving average and AR models. Comparison of time and frequency domain approaches.
*Prerequisite:* One full STA course and permission of instructor

STA466H **Probability I**
Expectations in $R^1$ and $R^r$ and more general probability spaces. Independence and of random variables. Characteristic functions and elementary central limit theorem.
*Prerequisite:* MAT239Y/250Y, STA352Y

STA467H **Probability II**
Independence, the central limit theorems, laws of large numbers, convergence con An introduction to conditional expectation and martingales.
*Prerequisite:* STA466H

STA470H **Statistical Methods in the Biological Sciences**
A survey covering the wide variety of statistical methods used in the biological scie